

REMARKS

Claims 1-43 are pending in the present application. Claims 1-2, 13, 26, 33, and 39 have been amended. Support for the amendments indicated herein may be found, for example, in the discussion related to Figure 5 on page 15 of the Patent Application. No new matter has been added.

In the Office Action, the Examiner rejected claims 1-7 and 9-43 under 35 U.S.C. § 102(b) as allegedly being anticipated by Clapp (U.S. Patent Application Publication No. 2003/0039447). Claim 8 was rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Clapp. Pursuant to the amendments indicated herein, the Examiner's rejections are respectfully traversed.

Light can propagate through conventional optical elements in a number of different polarization modes, for example the so-called transverse electric or transverse magnetic (TE and TM) modes. Typical multiple quantum well (MQW) high performance distributed feed back (DFB) or Bragg lasers for optical applications generate light that is emitted from the chip's edge. The light emitted from such a laser is essentially in a transverse electric mode and is often contained in a highly anisotropic "elliptical" spot. This is not the most efficient mode for coupling with other optical elements. These other optical elements may include optical fibers or optical components processing the light.

This is a particular problem when integrating a number of optical components on a substrate such as a multi-chip module. This is true for example when integrating a CMOS chip with optical interconnect at the board level or monolithically. Since light from the laser couples efficiently into the optical component in the optimal mode for transmitting that light into the integrated assembly, the use of light with an unsuitable mode results in significant fractions of the light being radiated instead of entering the optical component. This light will then add to the

cross-talk and cause possible multi-path interference issues throughout the construct and may well be picked up elsewhere within the system causing crosstalk or noise. Further, such losses require the laser to be operated at a higher than necessary power output to achieve sufficient light coupled into the optical components. This reduces efficiency.

At least in part to address these drawbacks in the conventional practice, the pending claims (as amended herein) set forth a strip-loaded waveguide includes a substrate and first and second layers of waveguiding material formed over the substrate. The indices of refraction, horizontal dimensions, and vertical dimensions of the first and second layers are arranged so that the strip-loaded waveguide performs an optical mode transformation of light that is input into the waveguide.

Clapp is concerned with a totally different problem. Clapp relates to an optical modulator, *i.e.* an optical switch for switching light off and on, and, in that case, very rapidly. However, Clapp is completely silent with regard to using the strip-loaded waveguide to perform optical mode transformations of input light.

For at least the aforementioned reasons, Applicants respectfully submit that the pending claims (as amended herein) are not anticipated by Clapp and request that the Examiner's rejections of claims 1-7 and 9-43 under 35 U.S.C. § 102(b) be withdrawn.

Moreover, Applicants respectfully submit that the pending claims (as amended herein) would not have been obvious over the prior art of record. A finding of obviousness under 35 U.S.C. § 103 requires a determination of the scope and content of the prior art, the level of ordinary skill in the art, the differences between the claimed subject matter and the prior art, and whether the differences are such that the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made. *Graham v. John Deere Co.*,

148 USPQ 459 (U.S. S.Ct. 1966). To determine whether the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made, one should determine whether the prior art reference (or references when combined) teach or suggest all the claim limitations. Furthermore, it is necessary for the Examiner to identify the reason why a person of ordinary skill in the art would have combined the prior art references in the manner set forth in the claims. Moreover, there should be a reasonable expectation of success on the part of a person of ordinary skill in the art.

As discussed above, Clapp fails to describe or suggest any technique for using a strip-loaded waveguide to effect an optical mode transformation of input light. Furthermore, Applicants respectfully submit that the Examiner has not provided any reason why person of ordinary skill in the art would have been motivated to modify the subject matter described in Clapp to arrive at the subject matter set forth in the pending claims (as amended herein). To the contrary, Applicants respectfully submit that mode transformation would not have been the primary goal nor an obvious development from the concepts described in Clapp. Applicants further submit that persons of ordinary skill in the art would have recognized that modifying the concepts described in Clapp would not offer any *a priori* advantage over conventional practice. Thus, in optical switches using strip-loaded waveguides, persons of ordinary skill in the art would have designed the waveguides to operate with design parameterisation appropriate to derive the best power product of modulation bandwidth, drive energy, and losses. Persons of ordinary skill in the art would therefore have not been motivated to modify the waveguide described by Clapp so that this waveguide would perform optical mode transformations of input light.

For at least the aforementioned reasons, Applicants respectfully submit that the pending claims (as amended herein) would not have been obvious over Clapp and request that the Examiner's rejection of claim 8 under 35 U.S.C. § 103(a) be withdrawn.

The Examiner is invited to contact the undersigned at (713) 934-4052 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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Date: August 11, 2008

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